# "Fast Cyber and Heavy ISR"
# Scientific Advisory Board Remarks

**Wednesday, 8 October 2008**

**General Norty Schwartz**

Thank you for allowing me to join you today. I am very privileged to meet with such a remarkable group dedicated to promoting our Nation's ability to fly, fight and win in air, space and cyberspace. Your efforts uphold the finest traditions of scientific merit securing our freedoms through innovation and discovery. I am very proud of your work, your heritage, and the ongoing benefit your advice provides the Air Force as we prepare to meet the challenges of the 21st Century. Thank you for your continued service and devotion to the highest standards of scientific and engineering excellence. This group's contribution to the Nation since its inception in 1946 has provided the foundation for the most technologically advanced air, space and cyberspace capabilities extant today. Who could imagine the far-reaching impact of Hap Arnold's invitation to Theodore von Karman to analyze and improve the study and application of aeronautical science? It was an impact that would extend far beyond defense technology to improve the quality of life of American citizens and people around the world. We have enjoyed the greatest period of prosperity in our Nation's history thanks in large part to our application of the sciences in solving problems that previous generations found insurmountable. This is the work you continue today in the finest traditions of academic excellence and scientific rigor, and Arnold and von Karman would, I think, be very proud. I thank you for all you do to make our Air Force, our Nation, and the world better through the application of science.

## A WORLD OF CONSTRAINTS

Such applications help us contend with a world full of constraints. All of us here deal with numerous constraints day-to-day, constraints that come in a variety of forms. Some are physical, and some are fiscal, but your work is a testament to the fact that despite a world of constraints, thinking is still free. In fact, many historic innovations were born in a cradle of austerity. And thanks to you, the Air Force doesn't face an intellectual constraint in scientific innovation. This is the value of a body like the Scientific Advisory Board. Even as defense budgets come and go, we are deeply invested in an intellectual "hedge fund" that always pays a sizeable dividend. Austerity casts an unwelcome shadow for those not so wisely invested, but for the Air Force, we confidently reap intellectual rewards in spite of constraints.

## FAST TANKS AND HEAVY BOMBERS

A book by David E. Johnson titled *Fast Tanks and Heavy Bombers* provides an interesting historical example. Johnson examined the difference in the pace and effectiveness between two innovative technologies that emerged in World War I. The tank and the airplane were two novel military manifestations that received notably different treatment within the defense establishment. In 1920, the speed of mobility was measured relative to the pace of marching soldiers or the animals that carried them. Many accomplished military thinkers allowed the past to restrict their thinking, and that created formidable intellectual constraints. Even the most senior military decision makers were not immune. One well-known general officer commented on the findings of an advisory board report saying, "it seems obvious that a large proportion of the transport permanently assigned to divisions should be animal drawn."[1] This was in 1920, and yes, there was a lively debate over the need to rely on Army horses in future wars. It may seem amusing to reflect on the military debate over the long-term viability of horse carriage techniques in 20th Century warfare, but I ask if today we might be guilty of one or more intellectual equivalents for 21st Century warfare? As Johnson points out, airplane technology advanced relatively free of intellectual constraints and was therefore better developed for contributing to victory in the next war.

The story is complex and interesting, with a delicate interplay of organizational and cultural drivers, but the conclusion serves as a warning to us today. We are responsible for our own preparedness; we are responsible for developing innovative ways and means for winning the current war and the next. I look to this group to provide us with that innovative focus, and we must continue to challenge ourselves with new thinking and advanced concepts.

## FAST CYBER AND HEAVY ISR

What will the books written 80 years from now say of our ability to do this? Will we prove ourselves any better at innovative thinking? I hope the answer is "yes," and your work inspires confidence. We have our corollary innovations emerging in the current fight. We see significant capabilities in unmanned aircraft systems, coupled with game-changing capabilities in ISR, integrated with global strike capabilities in advanced Joint command and control systems by revolutionary cyber technology. Perhaps in 80 years the book title will be *Fast Cyber and Heavy*

[1] General John Pershing, Wrapper Endorsement, G.H.Q., A.E.F, forwarding "Report of A.E.F. Superior Board on Organization and Tactics," June 16, 1920, quoted in *Fast Tanks and Heavy Bombers, p. 57*

*ISR*? Or will it be one of the innovative technologies only those of you here are familiar with? For though we recently recognized cyberspace as a warfighting domain along with the land, maritime, air and space domains, who is to say that cyberspace is the fifth *and final* domain? Will there be a sixth? Each of the current domains has risen to strategic relevance at a pace that accelerates with the exponential increase in the speed of the emergence of new technology. Does this suggest that a sixth domain might emerge and become relevant even faster than the "26 years" that cyberspace took?[2] What will it look like? How will it change things? Will its nature be cognitive or physical? Will it be in the neural pathways of the mind, or in the space between molecules? Will we face a fight in a virtual world, or in the infinitesimal regions of "nanospace?"

I challenge you to provide answers to these questions and more. I commit to you that the Air Force's uniformed leaders will listen. For innovative strategic thinking is a team sport. It takes all of us to conceive, comprehend and take action on the ways and means of today *and* of tomorrow. And the Air Force must continue our tradition of leading the way in technological innovation.

## IN ALL THINGS, MODERATION

Even as we partner together to innovate revolutionary technologies we must not lose sight of another aspect of history Johnson notes. As we focus on innovation, we must never forget the fundamentals. Some things will never change. Human nature, morality, ethics and leadership all have timelessness worthy of recognition. We must keep our feet firmly planted in the basics. Johnson wrote of those responsible for innovating airplane technology, "their zealousness blinded them to the flaws inherent in the technology and the doctrine they designed around it."[3] Advanced technology is no substitute for authentic insight and leadership. People must always take precedence over machines. A famous fighter pilot once said, "People, ideas, equipment—in that order!"[4] If we show zeal of any kind, it should be one for taking care of our Airmen, their families, and for taking care of each other as members of the community of Airmen.

---

[2] "*26 Years After Gibson, Pentagon Defines 'Cyberspace,*'" WIRED, 23 May 2008
[3] *Fast Tanks and Heavy Bombers*, page 228
[4] Col. John Boyd

CONCLUSION

Thank you all, once again, for helping the Air Force strike this delicate balance. You truly make great contributions to our Service and the Nation in all you do everyday. It is an honor to serve alongside you. I look forward to our ongoing conversation, and I look forward to the insights you will share. Thanks for the opportunity to join you today.